

- Integral sensors for x,y,z acceleration and temperature
- 10 analogue 0-5v, 1 thermocouple and 1 serial input.
- Up to 7 analogue inputs can be configured for frequency inputs from flow meters
- User programmable
- Supports voltage (0-5v) and frequency inputs
- 1 serial channel for RS485 MODBUS data or other protocols as required
- Serial channel can read up to 8 Keller pressure sensors.
- Optional high contrast LCD display with backlight
- Backlight can be turned on and off via a light sensor.
- Internal memory 10M readings
- SD memory card slot
- External power supply 11-30vDC or internal battery.
- Power consumption 7mA with display backlight on , 4mA with display off



The Merlin data logger is a compact, low power multi channel device capable of handling a range of analogue and serial inputs, with logging rates of up to 1Hz on analogue inputs and 20Hz on up to three Keller pressure sensors.

It has 10 analogue inputs with a 0-5v input range. Seven of these inputs can also be configured to read frequency inputs from flow meters. The unit also has a serial RS485 port for connection to Keller digital pressure sensors, and other serial devices.

The logger is supplied with windows software and logging projects are easily configured via the menu driven interface. In addition to taking instantaneous readings the logger can also record, minimum, maximum and average values. Each channel can be set with two logging rates: a slow rate for normal data capture and a fast rate which can be triggered by an analogue threshold for fast logging.

The logger has a large high contrast backlit LCD display, with the option to have a second display fitted. The display is programmable via the software and can be set to show either 12 channels or 3 channels. The dual display option is particularly useful in applications where a number of channels are required to be displayed in large text such as in subsea applications where real time values need to be viewed



The logger is shown here with the display set for 12 channels.

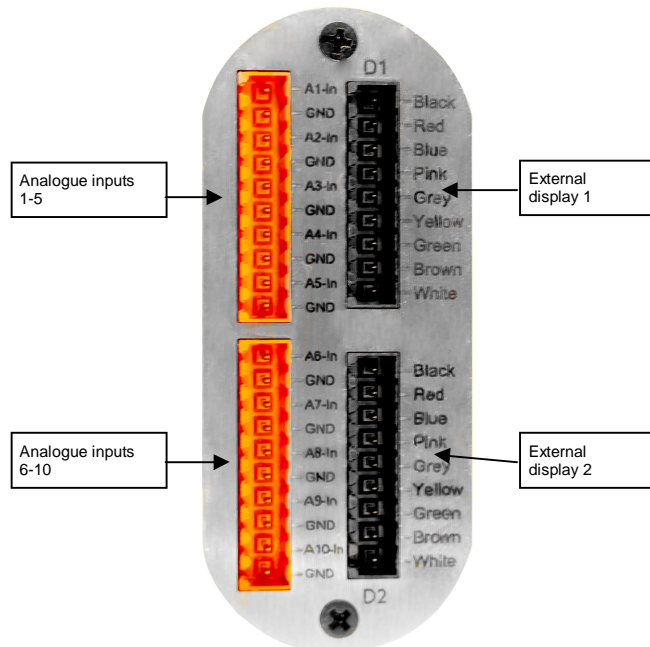
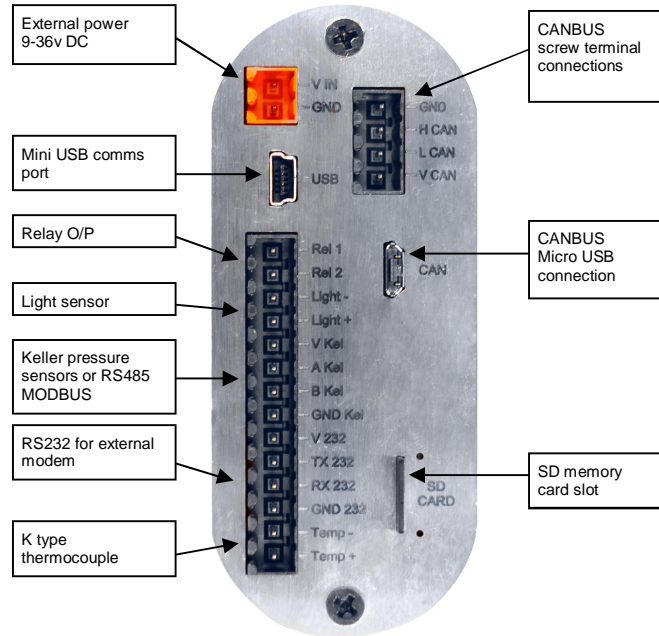
The logger also has an internal 3 axis accelerometer for motion sensing, an internal temperature sensor, and an external input for a K type thermocouple.



## Specification - Merlin Data Logger

Analogue Inputs	0-5v DC or AC frequency ( on 7 of the 10 analogue inputs ), resolution 12 bit ( 1.2 mV, )
Input Channels	10 analogue, 1 thermocouple, 1 serial RS485 MODBUS/Keller protocol
Internal Sensors	Three axis accelerometer, range +/- 16g, temperature sensor, light sensor
Output Channels	RS232 for serial data, 1 x relay output for sensor power management
Memory Capacity	1,500,000 readings internal + SD memory card slot
Logging Modes	Single point, average, min, and max
Logging Rate	Programmable - 1 Hz up to 12 hours
Data Retention	Over 200 years with no power
Operating Range	-40 to +60 degrees C
Power Supply	External 10-30v DC, consumption 4 mA @ 12v without display
Data Format	Graphic and CSV, suitable for export to Excel
Display	Optional high contrast backlit LCD 1 or 2 x 72 x 45 mm showing up to 12 channels of measurements simultaneously.
Communications	RS232 port for data download and logging control USB port for logger programming and setup Optional optical modem for subsea applications
Software	Windows software included for logger control and programming. Logger control application is a simple user interface to launch logger project and download data. Programming interface provides a menu driven graphical interface for setting up the logger program, downloading and viewing data.
Physical	Extruded aluminium housing with stainless steel end plates. Dimensions: 130 x 95 x 40mm

## Merlin Data Logger - Connections



## Logger Software Overview

The logger is programmed via a user friendly windows software interface with a control panel for starting and stopping logger, uploading new logger configurations, and downloading data.

Logging projects for various sensors inputs, logging rates etc can be quickly and easily created via the menu driven configuration interface.

Downloaded data can be viewed in graph and table format and exported to MS Excel.

## Control Panel

The control panel provides a simple interface to connect to the logger, start and stop logging and download data. The logger setup utility is also accessed via the control panel.

File Service



### Logger

Disconnect

Online

Logger: V0.07 SN1  
Memory: 2380:0  
Logging: inactive  
Configuration: test3-v8-4xKel-SD  
in progress: test3-v8-4xKel-SD (logger)

### Logging

Start Logging

Stop Logging

Download Data

### Configuration

Download from logger

Modify

Upload to logger

### Project file

Open

Save

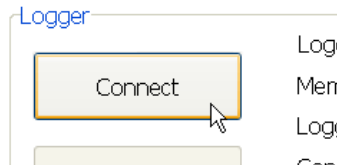
Close



## Logger Software Overview

### Control Panel

To connect to the logger plug in the USB cable and click the Connect button

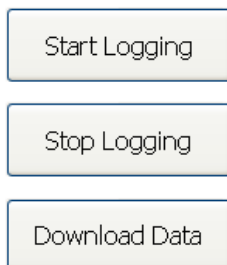


Once connected you will see the status of the logger:

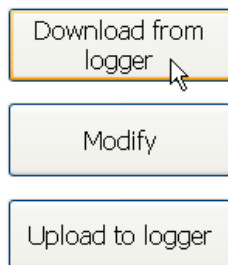
Logger:	V0.07 SN1	←	Firmware version
Memory:	2380:0	←	Available memory
Logging:	inactive	←	Logging status
Configuration:	test3-v8-4xKel-SD	←	Program loaded

in progress: -

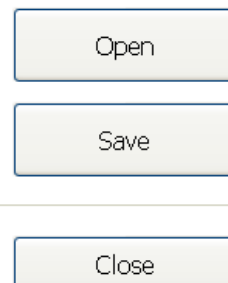
#### Logging



#### Configuration

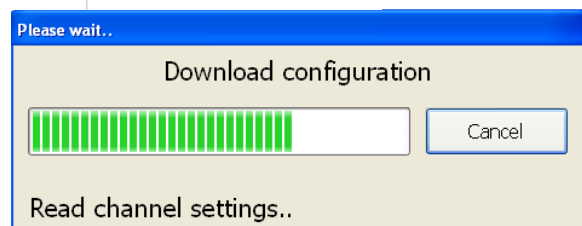


#### Project file



You can download the configuration that is in the logger by clicking on the **Download from logger** button. Once it has been downloaded you can modify the program by clicking on the **Modify** button you can open an existing project saved on the PC by clicking on the **Open** button.

A new or modified program can then be uploaded to the logger using the **Upload to logger** button.



## Logger Setup

Once the setup menu has been entered a row of tabs will be displayed for analogue input configuration, serial pressure sensor configuration, active channels, display configuration, logging rates, and maths channels, such as flow calculation.

There are 10 analogue inputs, the first 7 of which can be set to 0-5v input, or frequency ( for flow meters ). Analogue channels 8-10 are only available with 0-5v input.

Analog/FLOW inputs | Pressure sensors | Channels | Display | Tasks | Flow calculation | Record control

### Port configuration

Port number	Selection
Input0	A1
Input1	A2
Input2	A3
Input3	A4
Input4	A5
Input5	F6
Input6	F7

The pressure sensor tab is for setup of Keller pressure sensors with a serial RS485 output. Standard sensors provide 0.05% accuracy and high precision sensors provide 0.01% accuracy.

Up to 8 sensors can be connected to the serial bus input. In the setup the address of each sensor must be entered. If temperature measurement is required from the sensor the  with Temperature Channel box should be ticked.

In this menu the sensor address can be set, which should match the address programmed to each unit.

Analog/FLOW inputs | **Pressure sensors**

with Temperatur channel

active	Address
<input checked="" type="checkbox"/> 1:	1
<input checked="" type="checkbox"/> 2:	2
<input checked="" type="checkbox"/> 3:	3
<input checked="" type="checkbox"/> 4:	4
<input type="checkbox"/> 5:	250
<input type="checkbox"/> 6:	250
<input type="checkbox"/> 7:	250
<input type="checkbox"/> 8:	250

## Logger Setup

The Channels setup menu allows each individual channel to be configured with a custom label, and scaling for engineering units with 0 offset and gain automatically calculated. The number of decimal places for the channel to be shown on the LCD display and real time PC display is also set here.

Analog/FLOW inputs
Pressure sensors
Channels
Display
Tasks
Flow calculation
Record control

Overview

Channel	Name	Unit	Format	modified	Calibration
Analog					
1	A1	cts	0	no	no
2	A2	cts	0	no	no
3	A3	cts	0	no	no
4	A4	cts	0	no	no
5	A5	cts	0	no	no
8	A8	cts	0	no	no
9	A9	cts	0	no	no
10	A10	cts	0	no	no
Flow					
16	F6	Hz	0	no	no
17	F7	Hz	0	no	no
18	MF1	ppm	0	no	no
19	MF2	ppm	0	no	no
20	MF3	ppm	0	no	no
21	MF4	ppm	0	no	no
22	MF5	ppm	0	no	no
23	MF6	ppm	0	no	no
24	MF7	ppm	0	no	no
25	MF8	ppm	0	no	no
26	MF9	ppm	0	no	no
27	MF10	ppm	0	no	no
Keller					
28	P1	bar	0.000	no	no
29	TKel1	°C	0.0	no	no
ACC					
44	ACCx	g	0.000	no	no
45	ACCy	g	0.000	no	no

Change basic parameter of channel 16

Factory setting

Name

Unit

Display format

User information

Name

Unit

Gain  ...

Offset

Display format  ▼

Apply user information

Calculation assistant

Point P1

True value  LTRs/M

Measured value  Hz

Point P2

True value  LTRs/M

Measured value  Hz

## Logger Setup

The display menu is used to define the number of the displays and which channels are shown. If a single display is used up to 12 channels can be displayed in two columns of 6. If two displays are used then up to 12 channels can be displayed, 6 on each display. In this mode each display will show the first three channels and then scroll to the next three channels.

In this menu the LCD contrast is set, and also the control for the backlight. The backlight can be always on, or activated via the light sensor, in which case the time the light stays on after activation can be set in seconds. This function is very useful where the backlight needs to be activated by an ROV using a light.

The screenshot shows the 'Display' menu with the following settings and callouts:

- Display type:**
  - 1 display (2 columns, 6 lines)
  - 2 displays (1 column, 3 lines)
- Refresh rate:** 10
- LCD contrast:**
  - LCD1 contrast: 100
  - LCD2 contrast: 100
- Displayed channels:**

	display 1	display 2
line 1	TK2	P1
line 2	P3	TK1
line 3	TK3	P2
line 4	off	P4
line 5	off	TK4
line 6	off	off
- Backlight control:**
  - always off
  - light sensor activated with the time 30 sec
  - always on

Callout boxes provide additional context:

- "Sets the logger for single or dual display mode." (points to Display type)
- "Sets the LCD contrast" (points to LCD contrast)
- "Sets the rate at which the display scrolls if there are more than 6 channels used with a two display setup" (points to Refresh rate)
- "Here you can select which channels are to be shown on individual displays" (points to Displayed channels)
- "The backlight can be set to always off, always on, or activated by the light sensor with a set time for how long it will be on." (points to Backlight control)



## Logger Setup

The tasks menu is used to setup which channels are active, the sample interval, logging rate for each channel (slow and fast), and the parameters to be logged - current value, minimum value, Maximum value and Average.

The screenshot shows the Merlin Data Logger interface with the 'Tasks' menu selected. The main window displays a table of tasks and channels. A 'Task/Channel properties' dialog box is open, showing configuration options for a selected task.

Task/Channel	Sampling interval	Sensor turn-on-time	Record interval (slow)	Record interval (fast)	Values to be recorded
Analogue	1sec	512			
A1			1sec	1sec	current
A2			1sec	1sec	current
A3			1sec	1sec	current
A4			1sec	1sec	current
A5			1sec	1sec	
A8			1sec	1sec	
A9			1sec	1sec	
A10			1sec	1sec	
Flow	1sec	--			
F6			1sec	1sec	current
F7			1sec	1sec	current
MF1			1sec	1sec	
MF2			1sec	1sec	
MF3			1sec	1sec	
MF4			1sec	1sec	
MF5			1sec	1sec	
MF6			1sec	1sec	

**Task/Channel properties dialog box:**

- Task: Sample interval: 1 (unit: sec)
- Sample interval min.: 1sec
- Sensor turn-on-time: 512 mSec
- Channel: Samples per record (slow): 30, record interval: 30sec
- Samples per record (fast): 1, record interval: 1sec
- Active:  Current value,  Minimum value,  Maximum value,  Average value

The Flow Calculation menu is used to select pre defined custom maths calculations for your application

The screenshot shows the 'Flow calculation' menu in the Merlin Data Logger software. The 'Overview' tab is active, displaying a table of math channels.

Math channel	Mode	Channel 1	Channel 2
MF1	PPM calculation	F6	F6
MF2	PPM calculation	F6	F6
MF3	PPM calculation	F6	F6
MF4	PPM calculation	F6	F6
MF5	PPM calculation	F6	F6
MF6	PPM calculation	F6	F6
MF7	PPM calculation	F6	F6
MF8	PPM calculation	F6	F6
MF9	PPM calculation	F6	F6
MF10	PPM calculation	F6	F6

## Logger Setup

The record control menu defines the logging start mode - immediate start, or at a pre-defined time. This menu is also used to set an analogue input threshold to trigger fast logging.

Analog/FLOW inputs
Pressure sensors
Channels
Display
Tasks
Flow calculation
Record control

**Start options**

Start immediately

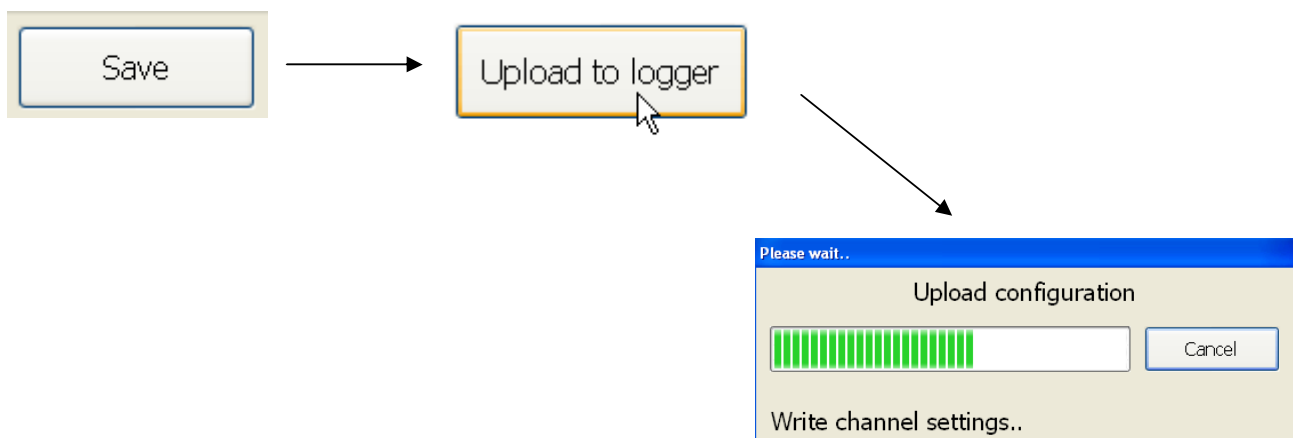
Start at

Stop at

**Trigger Slow/Fast record control**

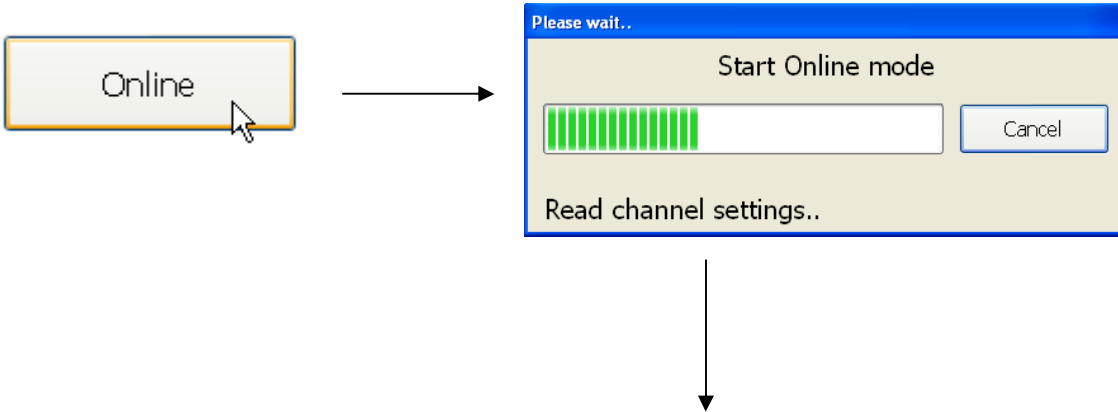
Channel	Condition	threshold 1	threshold 2
... <input type="checkbox"/> A1	X >= threshold 1	100 cts	200 cts

Once the setup has been completed it can be saved and uploaded to the data logger. Configurations can also be downloaded from the logger, modified, saved and uploaded back to the logger.



## Online Mode

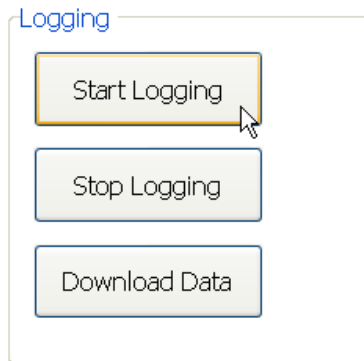
To view real time reading from the logger on your PC screen click on the **Online** button.



P1	-0.039	bar
TKel1	21.0	°C
P2	-0.034	bar
TKel2	21.0	°C
P3	-0.042	bar
TKel3	21.5	°C
P4	-0.041	bar
TKel4	21.5	°C
ACCx	0.996	g
ACCy	0.036	g
ACCz	0.248	g

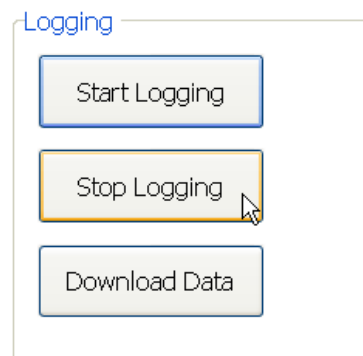
## Start Logging

To start logging click on the **Start Logging** button



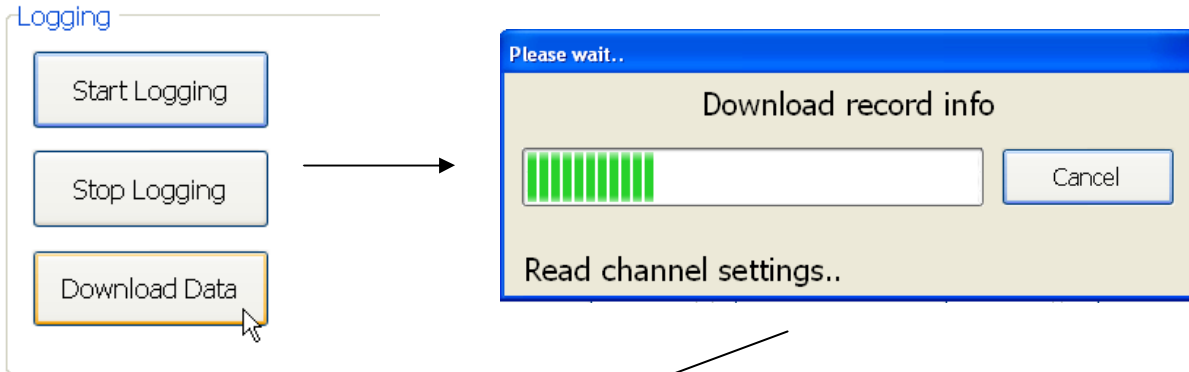
## Stop Logging

To stop logging click on the **Stop Logging** button



## Download Data

To download data click on the **Download Data** button



Record number	Start date	Pages
<input checked="" type="checkbox"/> 1	2013-09-16 14:18:40	1
<input type="checkbox"/> 2	2013-09-09 17:38:08	1
<input type="checkbox"/> 3	2013-09-09 17:33:52	1
<input type="checkbox"/> 4	2013-09-09 12:55:28	22
<input type="checkbox"/> 5	2013-09-09 12:43:44	1
<input type="checkbox"/> 6	2013-09-09 12:21:20	3
<input type="checkbox"/> 7	2013-09-09 12:17:04	1
<input type="checkbox"/> 8	2013-09-09 12:13:52	1
<input type="checkbox"/> 9	2013-09-09 12:05:00	1

At the bottom of the window is a 'Continue' button.

A dialog box will appear showing all logging sessions.

Check the boxes for the logging sessions you wish to download and click **Continue**

This dialog box is titled 'Please wait..' and 'Download record info'. It contains a progress bar with green vertical bars, a 'Cancel' button, and the text 'Read record info..'.

The 'Log window' displays the following text:

```
COM2: no logger connected
COM1: no logger connected
COM16, SN1
C:\Documents and Settings\j\jurness\My
Documents\MSR\data\MSR_1_130916_141840.msr
```

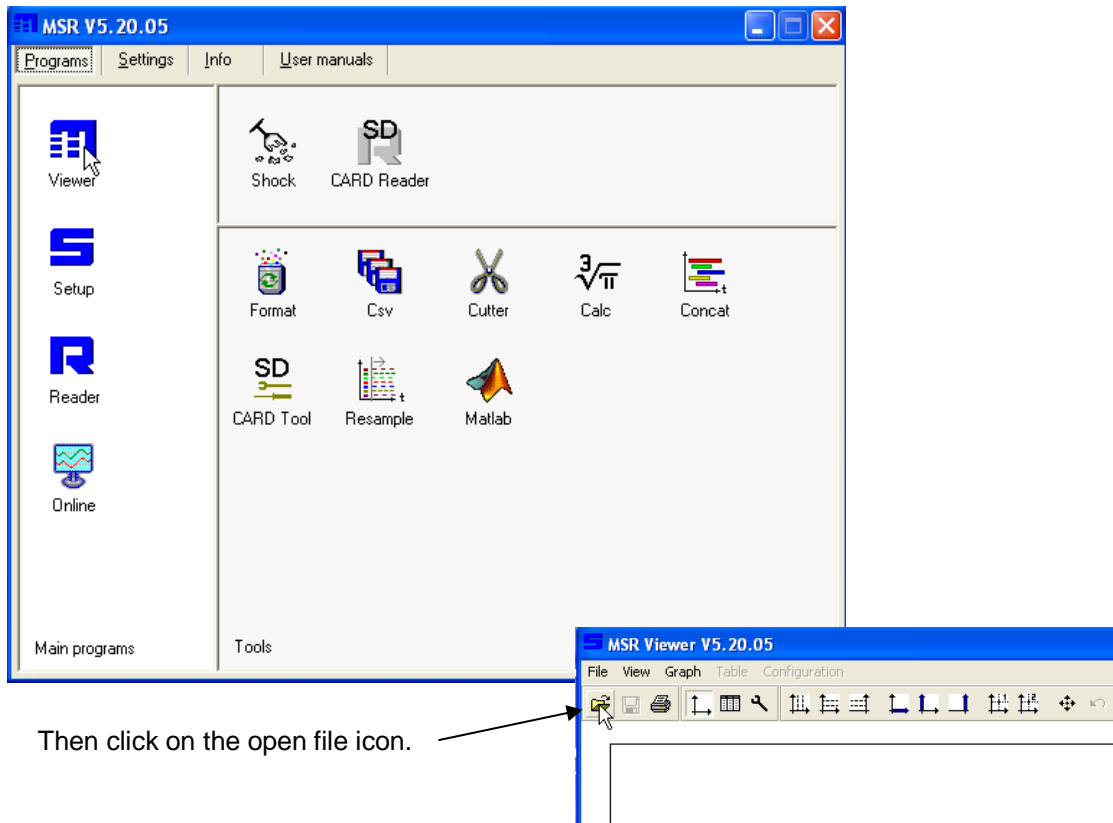
An 'OK' button is located at the bottom of the window.

Once the data has been downloaded a dialog box will appear showing the filename and location for the saved data file.

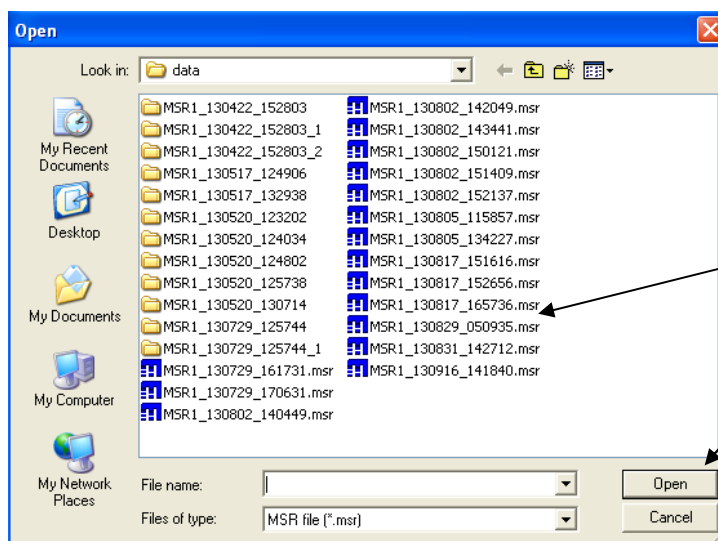


## Viewing and exporting downloaded data

To view data from a downloaded data file run the MSR 5 software, and click on the Viewer icon



Then click on the open file icon.

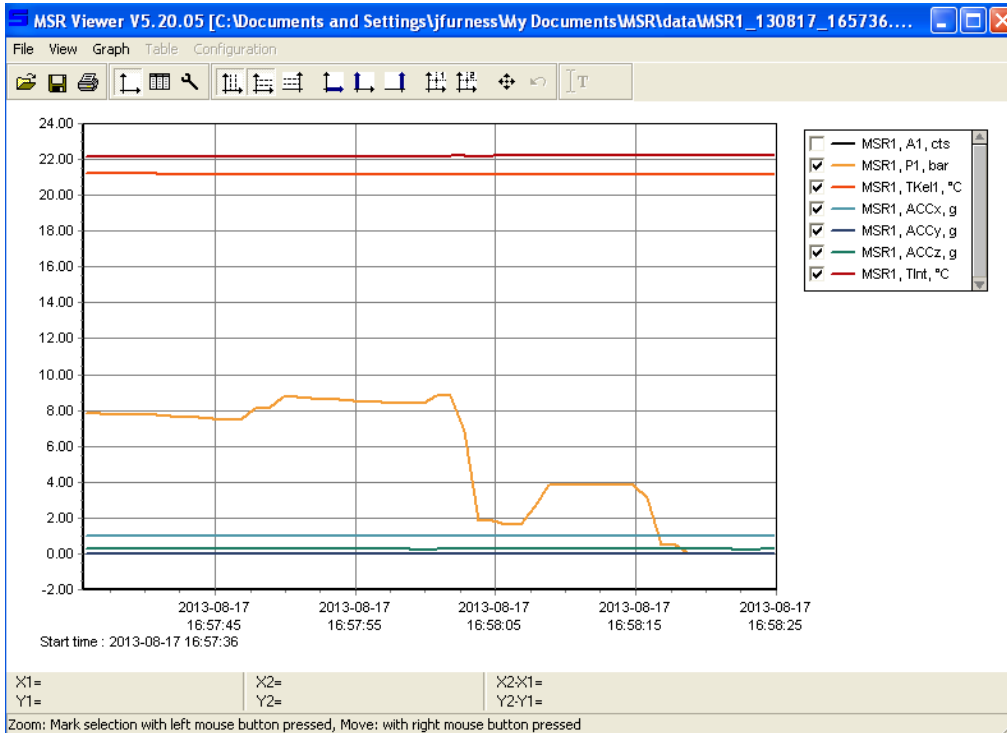


A dialog box will appear showing all the saved data files.

Select the file you wish to open and click on the open button

## Viewing and exporting downloaded data

The data file will open in the graph view. Channels shown on the graph can be activated or turned off by checking or un-checking the channels in the channel list to the right of the graph display

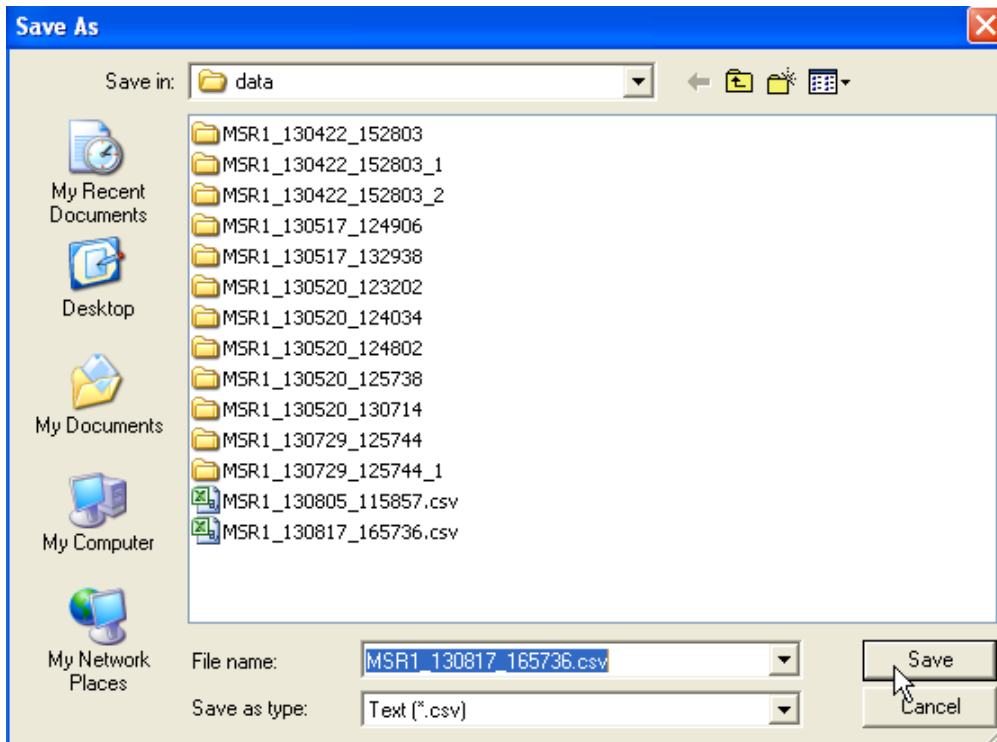
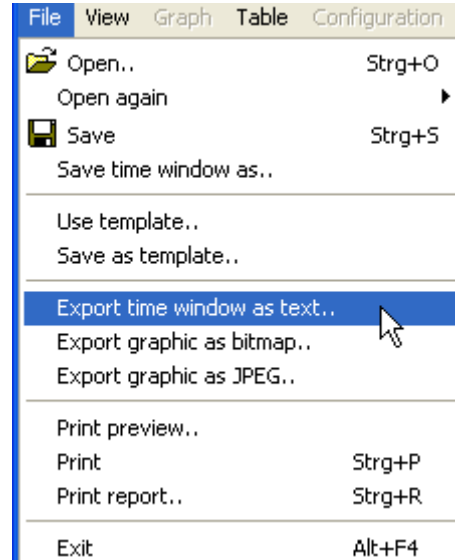


Data can also be viewed in a table format by clicking on the table icon.

Time	MSR1, P1, bar	MSR1, Tkel1, °C	MSR1, ACCx, g	MSR1, ACCy, g	MSR1, ACCz, g
2013-08-17 16:57:36.032	7.84195709228516	21.22900390625	0.98800003528595	0.0120000001043081	0.244
2013-08-17 16:57:37.032	7.81999969482422	21.2177734375	0.98800003528595	0.0120000001043081	0.252
2013-08-17 16:57:38.032	7.79019165039063	21.22900390625	0.98800003528595	0.00800000037997961	0.244
2013-08-17 16:57:39.032	7.76560974121094	21.2177734375	0.992000043392181	0.00800000037997961	0.252
2013-08-17 16:57:40.032	7.73870849609375	21.2412109375	0.992000043392181	0.0120000001043081	0.244
2013-08-17 16:57:41.032	7.72525024414063	21.19580078125	0.996000051498413	0.0120000001043081	0.252
2013-08-17 16:57:42.032	7.65761566162109	21.16064453125	0.996000051498413	0.0120000001043081	0.252
2013-08-17 16:57:43.032	7.632080078125	21.14990234375	0.996000051498413	0.0120000001043081	0.244
2013-08-17 16:57:44.032	7.632080078125	21.14990234375	0.992000043392181	0.0120000001043081	0.244
2013-08-17 16:57:45.032	7.54911804193219	21.16064453125	0.992000043392181	0.00800000037997961	0.244
2013-08-17 16:57:46.032	7.48407745361328	21.1259765625	0.992000043392181	0.0120000001043081	0.244
2013-08-17 16:57:47.032	7.48407745361328	21.1259765625	0.98800003528595	0.00800000037997961	0.244
2013-08-17 16:57:48.032	8.12702178955078	21.16064453125	0.996000051498413	0.0160000007599592	0.252
2013-08-17 16:57:49.032	8.12702178955078	21.16064453125	0.992000043392181	0.00800000037997961	0.244
2013-08-17 16:57:50.032	8.78861999511719	21.1376953125	0.992000043392181	0.0120000001043081	0.244
2013-08-17 16:57:51.032	8.78861999511719	21.1376953125	1	0.0120000001043081	0.252
2013-08-17 16:57:52.032	8.67179870605469	21.1376953125	0.996000051498413	0.00800000037997961	0.244
2013-08-17 16:57:53.032	8.64496612548828	21.1376953125	0.992000043392181	0.0120000001043081	0.244
2013-08-17 16:57:54.032	8.59840393066406	21.16064453125	0.996000051498413	0.0120000001043081	0.252
2013-08-17 16:57:55.032	8.55519104003906	21.1259765625	0.992000043392181	0.00800000037997961	0.244
2013-08-17 16:57:56.032	8.50450134277344	21.1259765625	0.98800003528595	0.0120000001043081	0.252
2013-08-17 16:57:57.032	8.46127319335938	21.1376953125	0.992000043392181	0.0120000001043081	0.252

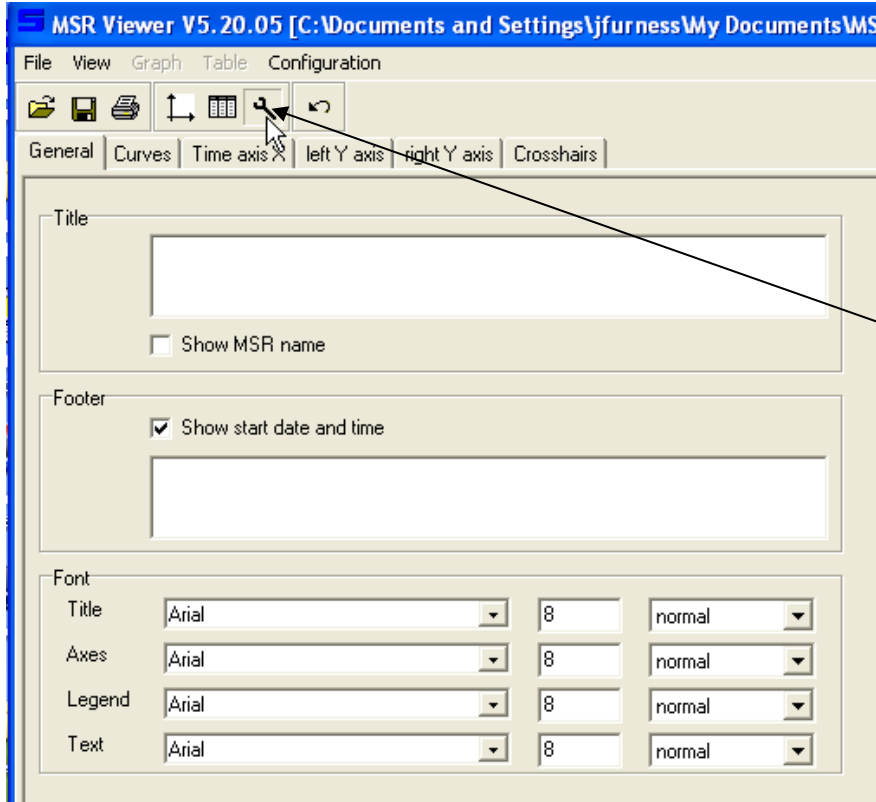
## Viewing and exporting downloaded data

To export the data to MS XLS click on **F**ile and select **E**xport time window as text ..



The file will be converted to a .CSV file which can be opened in MS XLS, Notepad, and various data base application for further manipulation and reporting etc.

## Viewing and exporting downloaded data



The setup for the graph including X and Y axis, curve colours and thickness can be accessed in setting menu.